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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/856,746	Applicant(s) VAISANEN ET AL.	
	Examiner Lana N. Le	Art Unit 2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,4,11,21-23,26 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-4, 11, 21-23, 26 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-4, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isberg et al (US 6,029,052) in view of Auvray (US 5,564,076) in view of Smith et al (US 5,694,414).

Regarding claim 1, Isberg et al discloses a method for processing signals received from different radio interfaces of communication systems, (i.e. DCS and PCS; col 2, lines 13-16; col 4, lines 61-66), comprising steps in which:

steps in which a carrier frequency signal is received via antenna (10) (col 4, lines 61-66) from a radio interface of a system on one of a plurality of frequency bands (i.e. GSM; fig. 5; col 2, lines 15-16);

the signal at the carrier frequency is bandpass filtered via 12a, 12b, 12c (fig. 5 and hereafter; col 5, lines 1-3);

the filtered signal at the carrier frequency is amplified via 34a, 34b, 34d or via a common low noise amplifier for the branch 34b and 34d sharing a single mixing circuit 40, 41 and VCO 36 (col 5, lines 8-10; col 5, lines 18-21);

a RX mixing signal at the receive frequency is generated at numeral characters 36a, 36, 38, and reference character QUAD (col 5, lines 8-12);

a complex baseband signal (I, Q) is generated (via 40a, 41a, 40, 41) from the received carrier frequency signal by mixing it with the RX mixing signal (col 5, lines 6-8, col 5, lines 12-15),

the baseband signal (I, Q) generated is low-pass filtered (via 42a, 42b) (col 5, lines 11-14), and the baseband signal is processed (via reference character block Baseband Processing) so as to produce an information signal encoded and modulated into the received carrier-frequency signal (at the output of the reference character block Baseband Processing), wherein the amplifying of the carrier frequency signal is performed with one and same amplifier for signals received from at least two different radio interfaces (fig. 5 can share the common low noise amplifier in place of amplifiers 34b and 34d as a modified embodiment; see col 5, lines 18-32); the generating of the complex baseband signal is performed with one and the same mixer (in phase and quadrature mixers 40, 41; fig. 5) for signals received from at least two different radio interfaces (different radio interfaces of different communication systems DCS and PCS) (col 5, lines 7-19). However, Isberg et al fail to disclose the baseband signal generated is amplified or attenuated prior to analog to digital conversion; the baseband signal is converted to digital and is processed to produce an information signal encoded and modulated into the receive carrier frequency signal; and the bandpass-filtering is performed using a pass band, which is tunable or adjustable by means of programming. Auvray discloses a baseband signal processing technique in dual-mode (col 4, lines 38-

41) in which the baseband signal (232I, 232Q) is amplified or attenuated (via amplifiers 234i and 234Q; fig. 2 and hereafter; col 5, lines 33-36) prior to analog to digital conversion; the baseband signal is converted to digital (via A/Ns 235I, 235Q; col 5, lines 33-37) and is processed (via DSP1 24) to produce an information signal 23 encoded and modulated into the received carrier-frequency signal (col 5, lines 38-41). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have the baseband signal amplified prior to analog to digital conversion and processed in order to strengthen the baseband signal and to have a device that's capable of converting the received analog signal to digital so that the signal is convertable to a suitable binary code format to represent information suitable for further digital channel decoding and demodulation as suggested by Auvray (col 5, lines 38-41). Isberg et al and Auvray do not disclose wherein a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface from which signals are received, said RX mixing signal is generated with a frequency synthesizer, and an output frequency of said frequency
synthesizer is selected with a program-controlled frequency selection signal in relation to the radio interface from which signal are received, and the bandpass-filtering is performed using a pass band, with a program-controlled pass band selection signal in relation to the radio interface from which signals are received.

Smith et al disclose a gain of an amplifier (203; fig. 3) is set with a programmed controlled gain control signal (tunable amplifier) relation to the radio interface from which signals are received (col 3, lines 55-57), said RX mixing signal is generated with

a frequency synthesizer (105), and an output frequency of said frequency synthesizer is selected with a program-controlled frequency selection signal in relation to the radio interface from which signal are received (tunable or programmable based on the mode that is being received); a bandpass-filtering (117) performed using a pass band, with a program-controlled pass band selection signal (tuneable in relation to the radio interface (based on which mode is received via mode controller 103) from which signals are received (col 8, lines 40-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the bandpass filter, synthesizer, and amplifier of Isberg et al for the tunable bandpass filter, synthesizer, and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one common bandpass filter and one synthesizer to tune the frequency of the filter to correspond to the frequency of the band being received and to produce the needed mixing signal based on the particular frequency mode/band in operation while controlling the gain to its optimum according to the level of the received signal to tune to the appropriate band of the dual mode receiver as suggested by Smith et al.

Regarding claim 3, Isberg et al disclose a direct-conversion receiver (fig. 5 and hereafter; col 2, lines 7-12) operating at different radio interfaces of different communication systems (i.e. DCS and PCS; col 2, lines 13-16; col 4, lines 61-66), further comprising:

antenna means (10; col 2, lines 66-67) for receiving a carrier-frequency signal from a radio interface on one of a plurality of frequency bands (col 2, lines 15-16);

bandpass filter (12a, 12b, 12c) for filtering the carrier frequency signal (col 5, lines 1-3);

first receiver amplifier (34a, 34b, 34d) or via a common low noise amplifier for the branch 34b and 34d sharing a single mixing circuit 40, 41 and VCO 36 for amplifying the filtered carrier-frequency signal (col 5, lines 8-10; col 5, lines 18-21);

means (36, 36a, 38, and reference character QUAD) for generating an RX mixing signal at the receive frequency (col 5, lines 8-12);

mixing means (40a, 41a, 40b, 41b) for generating a complex baseband signal I, Q from the received signal by means of the RX mixing signal (col 5, lines 12-15; col 5, lines 6-8);

low-pass filter (42a, 42b) for filtering the baseband signal I, Q (col 5, lines 12-15);

means (reference character block Baseband Processing) for processing the baseband signal Processing so as to produce an information signal encoded and modulated into the received signal (at the output of the reference character block Baseband Processing; see fig. 5),

- wherein the first receiver amplifier is common for amplifying signals received from at least two different radio interfaces (fig. 5 can share the common low noise amplifier in place of amplifiers 34b and 34d as a modified embodiment for processing receive frequency signals received from at least two different radio interfaces of the different communication systems, DCS and PCS (fig. 5; col 5, lines 25-32),

- the mixing means (in phase and quadrature mixers 40, 41; fig. 5) for generating of the complex baseband signal is common for processing signals for signals received from at

least two different radio interfaces (two different radio interfaces of the two different communication systems DCS and PCS; col 5, lines 7-19).

However, Isberg et al fail to further disclose second amplifier for amplifying the baseband signal, analog-to-digital converter for converting the baseband signal digital, and means for processing the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal; a gain control input for receiving a program-controlled gain control signal adapted to set the gain of the first receiver amplifier in relation to the radio interface from which signals are received, said means for generating a RX mixing signal comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a RX mixing signal in relation to the radio interface from which signals are received, and the bandpass-filtering is performed using a pass band, with a program-controlled pass band selection signal in relation to the radio interface from which signals are received.

Auvray discloses a second amplifier (234i, 234Q; fig. 2 and hereafter) for amplifying the baseband signal (col 5, lines 33-36), an analog-to-digital converter (A/Ns 235I, 235Q) for converting the baseband signal to digital (col 5, lines 33-37); and means for processing the baseband signal converted to digital (DSP1 24) so as to produce an information signal (23) encoded and modulated into the received signal (col 5, lines 38-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a second amplifier, an A/D converter, in order to further process the baseband signal for further amplification which strengthens the baseband

signal and an A/D converter to convert the amplified baseband signal to a binary code format to represent information suitable for digital channel decoding and demodulation as suggested by Auvray (col 5, lines 38-40). Isberg et al and Auvray do not disclose a gain control input for receiving a program-controlled gain control signal adapted to set the gain of the first receiver amplifier in relation to the radio interface from which signals are received, said means for generating a RX mixing signal comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a RX mixing signal in relation to the radio interface from which signals are received, and the bandpass-filtering is performed using a pass band, with a program-controlled pass band selection signal in relation to the radio interface from which signals are received. Smith et al disclose a gain of an amplifier (203; fig. 3) is set with a programmed controlled gain control signal in relation to the radio interface from which signals are received via mode controller 103 (col 3, lines 55-57), the RX mixing signal is generated with a frequency synthesizer (105), the means for generating a RX mixing signal comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a RX mixing signal (105) in relation to the radio interface from which signals are received (tunable or programmable based on the mode that is being received) (col 8, lines 48-61), and the bandpass-filtering is performed using a pass band, with a program-controlled pass band selection signal in relation to the radio interface from which signals are received; a bandpass-filtering (117) performed using a pass band,

with a program-controlled pass band selection signal in relation to the radio interface (based on which mode is received via mode controller 103) from which signals are received (col 8, lines 40-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the bandpass filter, synthesizer, and amplifier of Isberg et al for the tunable bandpass filter, synthesizer, and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one common bandpass filter and one synthesizer to adjust the filter to a narrow or wide bandwidth and corresponding frequency and to produce the needed mixing signal based on the particular frequency mode/band in operation while controlling the gain to its optimum according to the level of the received signal to tune to the appropriate band of the dual mode receiver as suggested by Smith et al.

Regarding claim 4, Isberg et al, Auvray, and Smith et al disclose the receiver of claim 3, wherein Smith et al disclose the receiver further comprising means (103; fig. 3) for selecting the pass band of the bandpass filter (117) such that it corresponds to the receive frequency (col 7, lines 37-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the bandpass filter of the receiver system of Isberg et al and Auvray with the bandpass filter of Smith et al in order to allow receiver system to select either narrowband or wideband reception based on the particular frequency mode being in operation or the particular frequency band being received.

Regarding claim 11, Isberg et al, Auvray, and Smith et al disclose the receiver of claim 3, wherein Isberg et al further disclose the signal processing path comprises substantially the same components (the common low noise amplifier for the branch 34b and 34d sharing a single mixing circuit 40, 41 and VCO 36, LPFs 42a, 42b, and Baseband Processing for processing receive frequency signal for connecting to the different radio interfaces of the multiple mode reception of each band at BPFs 12a, 12b (see figure 5; col 5, lines 25-32).

Regarding claim 21, Isberg et al disclose direct-conversion receiver circuitry for operating in different radio communication systems, comprising:

a first receiver amplifier (34a, 34b, 34d) adapted to amplify a filtered carrier-frequency signal, a frequency synthesizer () adapted to generate a RX mixing signal at a receive frequency, a mixer (40a, 41a, 40b, 41b) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal, wherein said first receiver amplifier is common for amplifying signals received from at least two different radio communication systems (fig. 5 can share the common low noise amplifier in place of amplifiers 34b and 34d as a modified embodiment; see col 5, lines 18-32); wherein said mixer (in phase and quadrature mixers 40, 41; fig. 5) is common for processing signals received from at least two different radio communication systems (different radio interfaces of different communication systems DCS and PCS) (col 5, lines 7-19);

a digital signal processor (baseband processor) adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal (col 5, lines 12-15; fig. 5).

Isberg et al do not disclose a second amplifier adapted to amplify the baseband signal, an analog-to-digital converter adapted to convert the amplified baseband signal to digital, and coupling from the analog-to-digital converter to the digital signal processor adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal; wherein said first receiver amplifier comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, and wherein the frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a Rx mixing signal in relation to the radio communication system from which signals are received.

Auvray discloses a second amplifier (234I, 234Q; fig. 2 and hereafter) adapted to amplify the baseband signal (col 5, lines 33-36), an analog-to-digital converter (A/Ns 235I, 235Q) adapted to convert the amplified baseband signal to digital (col 5, lines 33-37), and coupling from the analog-to-digital converter (235I, 235Q) to a digital signal processor (DSP1 24) adapted to process the baseband signal converted digital so as to produce an information signal (23) encoded and modulated into the received signal (col 5, lines 38-41). Isberg et al and Auvray do not disclose the first receiver amplifier

comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, and wherein the frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a Rx mixing signal in relation to the radio communication system from which signals are received. Smith et al disclose a first receiver amplifier (203; fig. 3) comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received via mode controller 103 (col 3, lines 55-57), a frequency synthesizer (105) comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a Rx mixing signal in relation to the radio communication system from which signals are received (col 8, lines 48-61). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the synthesizer and amplifier of Isberg et al for the tunable synthesizer and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one synthesizer to produce the needed mixing signal based on the particular frequency mode/band in operation while controlling the gain to its optimum according to the level of the received signal to tune to the appropriate band of the dual mode receiver as suggested by Smith et al.

Regarding claim 22, Isberg et al, Auvray, and Smith et al disclose the direct-conversion receiver circuitry according to claim 21, wherein Smith et al discloses the receiver additionally comprising a bandpass filter (117) adapted to filter a carrier-frequency signal to produce said filtered carrier-frequency signal, said bandpass filter comprising a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received (col 8, lines 40-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the bandpass filter of Isberg et al with the bandpass filter of Smith et al in order to tune the filter to correspond to the frequency band being received.

Regarding claim 23, Isberg et al, Auvray, and Smith et al disclose the direct-conversion receiver circuitry according to claim 21, where Isberg et al disclose the receiver additionally comprising a low-pass filter (42a, 42b) between said mixer and said second amplifier, said low-pass filter being adapted to filter the complex baseband signal (col 5, lines 12-15).

Regarding claim 26, Isberg et al disclose a direct-conversion receiver for operating in different radio communication systems, comprising:

an antenna (10) adapted to receive a carrier-frequency signal from a radio communication system (col 2, lines 15-16, lines 66-67),

a bandpass filter (12a, 12b, 12c) adapted to filter the carrier-frequency signal;

a first receiver amplifier (34a, 34b, 34d) adapted to amplify the filtered carrier-frequency signal wherein said first receiver amplifier is common for amplifying signals

received from at least two different radio communication systems (fig. 5 can share the common low noise amplifier in place of amplifiers 34b and 34d as a modified embodiment; see col 5, lines 18-32);

a mixer (40a, 41a, 40b, 41b) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal,

wherein said mixer is common for processing signals received from at least two different radio communication systems (different radio interfaces of different communication systems DCS and PCS) (col 5, lines 7-19);

a low-pass filter (42a, 42b) adapted to filter the complex baseband signal (col 5, lines 12-15); and

a signal processor adapted to process the baseband signal so as to produce an information signal encoded and modulated into the received signal (reference block Baseband Processing; see fig. 5). Isberg et al do not disclose a second amplifier adapted to amplify the filtered complex baseband signal, an analog-to-digital converter adapted to convert the amplified filtered baseband signal to digital; and a digital signal processor adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal; and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, a frequency synthesizer adapted to generate a RX mixing signal filter the carrier-frequency at a receive frequency wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-

controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received, and wherein said bandpass filter comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received.

Auvray discloses a frequency synthesizer (215) adapted to generate a RX mixing signal filter the carrier-frequency at a receive frequency (col 5, lines 28-30); a second amplifier (234I, 234Q; fig. 2 and hereafter) adapted to amplify the filtered complex baseband signal (col 5, lines 33-36), an analog-to-digital converter (A/Ns 235I, 235Q) adapted to convert the amplified filtered baseband signal to digital (col 5, lines 33-37), and coupling from the analog-to-digital converter (235I, 235Q) to a digital signal processor (DSP1 24) adapted to process the baseband signal converted digital so as to produce an information signal (23) encoded and modulated into the received signal (col 5, lines 38-41). Isberg et al and Auvray do not disclose the receiver comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received, and wherein said bandpass filter comprises a pass band selection input for receiving a program-controlled pass

band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received. Smith discloses the receiver comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of a first receiver amplifier (203) in relation to the radio communication system from which signals are received via mode controller 103 (col 3, lines 55-57), a frequency synthesizer (105) comprising an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer (105) in relation to the radio communication system from which signals are received via mode controller 103 (col 8, lines 48-61), and the bandpass filter (117) comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received via mode controller 103 (col 8, lines 40-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the bandpass filter, synthesizer, and amplifier of Isberg et al for the tunable bandpass filter, synthesizer, and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one common bandpass filter and one synthesizer to adjust the filter to a narrow or wide bandwidth and corresponding frequency and to produce the needed mixing signal based on the particular frequency mode/band in operation while controlling the gain to its optimum according to the level of the received signal to tune to the appropriate band of the dual mode receiver as suggested by Smith et al.

Regarding claim 28, Isberg et al disclose a device for wireless communications (wireless communication device; col 2, lines 3-12), for operating in different radio communication systems, comprising:

an antenna (10) adapted to receive a carrier-frequency signal from a radio communication system (col 2, lines 15-16, lines 66-67),

a bandpass filter (12a, 12b, 12c) adapted to filter the carrier-frequency signal;

a first receiver amplifier (34a, 34b, 34d) adapted to amplify the filtered carrier-frequency signal wherein said first receiver amplifier is common for amplifying signals received from at least two different radio communication systems (fig. 5 can share the common low noise amplifier in place of amplifiers 34b and 34d as a modified embodiment; see col 5, lines 18-32);

a mixer (40a, 41a, 40b, 41b) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal,

wherein said mixer is common for processing signals received from at least two different radio communication systems (different radio interfaces of different communication systems DCS and PCS) (col 5, lines 7-19);

a low-pass filter (42a, 42b) adapted to filter the complex baseband signal (col 5, lines 12-15); and

a signal processor adapted to process the baseband signal so as to produce an information signal encoded and modulated into the received signal (reference block Baseband Processing; see fig. 5). Isberg et al do not disclose a second amplifier adapted to amplify the filtered complex baseband signal, an analog-to-digital converter

adapted to convert the amplified filtered baseband signal to digital; and a digital signal processor adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal; and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, a frequency synthesizer adapted to generate a RX mixing signal filter the carrier-frequency at a receive frequency wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received, and wherein said bandpass filter comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received.

Auvray discloses a frequency synthesizer (215) adapted to generate a RX mixing signal filter the carrier-frequency at a receive frequency (col 5, lines 28-30); a second amplifier (234I, 234Q; fig. 2 and hereafter) adapted to amplify the filtered complex baseband signal (col 5, lines 33-36), an analog-to-digital converter (A/Ns 235I, 235Q) adapted to convert the amplified filtered baseband signal to digital (col 5, lines 33-37), and coupling from the analog-to-digital converter (235I, 235Q) to a digital signal processor (DSP1 24) adapted to process the baseband signal converted digital so as to produce an information signal (23) encoded and modulated into the received signal (col 5, lines 38-

41). Isberg et al and Auvray do not disclose the receiver comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received, wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received, and wherein said bandpass filter comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received. Smith discloses the receiver comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of a first receiver amplifier (203) in relation to the radio communication system from which signals are received via mode controller 103 (col 3, lines 55-57), a frequency synthesizer (105) comprising an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer (105) in relation to the radio communication system from which signals are received via mode controller 103 (col 8, lines 48-61), and the bandpass filter (117) comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received via mode controller 103 (col 8, lines 40-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

substitute the bandpass filter, synthesizer, and amplifier of Isberg et al for the tunable bandpass filter, synthesizer, and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one common bandpass filter and one synthesizer to adjust the filter to a narrow or wide bandwidth and corresponding frequency and to produce the needed mixing signal based on the particular frequency mode/band in operation while controlling the gain to its optimum according to the level of the received signal to tune to the appropriate band of the dual mode receiver as suggested by Smith et al.

3. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isberg et al (US 6,029,052) in view of Auvray (US 5,564,076) in view of Smith et al (US 5,796,772) as applied to claim 3 above, and further in view of Auvray (US 5,953,641).

Regarding claim 6, Isberg et al, Auvray (US 5,564,076), and Smith et al disclose the receiver of claim 3, wherein Isberg et al, Auvray (US 5,564,076), and Smith et al don't further disclose the receiver is characterized in that the means for generating a mixing signal at the receive frequency comprises an RX synthesizer and a controllable frequency divider for dividing the frequency of the output signal generated by the RX synthesizer.

Auvray (US 5,953,641) discloses a receiver characterized in that the means for generating a mixing signal at the receive frequency comprises an RX synthesizer (SYN) and controllable frequency divider (DIV) for dividing the frequency of the output signal generated by the RX synthesizer (SYN; see fig. 1; col 4, lines 33-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use

a controllable frequency divider after the synthesizer output of Isberg et al and Auvray in order to change the frequencies by a factor to provide frequency channel selection and obtain the frequencies of another lower particular frequency band in use in response to the requirements of another communication system as suggested by Auvray (US 5,953,641; col 4, lines 33-40).

Regarding claim 7, Isberg et al, Auvray (US 5,564,076), Smith et al, and Auvray (US 5,953,641) disclose the receiver of claim 6, wherein Auvray (US 5,953,641) further discloses the receiver is characterized in that the frequency divider (DIV) is arranged so as to divide the output signal of the RX synthesizer (OL) always at least by two (col 4, lines 52-55) in order to generate a RX mixing signal (OL') (see fig. 1; col 4, lines 33-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to divide by at least two in order to obtain the frequencies needed for the frequency band of the particular system in operation.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isberg et al (US 6,029,052) in view of Auvray (US 5,564,076) in view of Smith et al (US 5,796,772) and further in view of Duong et al (US 5,511,235).

Regarding claim 8, Isberg et al, Auvray, and Smith et al disclose the receiver of claim 3, wherein Isberg et al, Auvray, and Smith et al don't further disclose the receiver further comprising means for controlling the cut-off frequency of low-pass filtering in order to perform channel filtering to the selected radio interface. Duong et al disclose the receiver further comprising means C1, C2 into LPFs 144, 145 (fig. 1) for controlling the cut-off frequency of low-pass filtering via filters 144, 145 in order to perform channel

filtering to the selected radio interface (col 3, lines 25-32; col 5, lines 8-10; col 4, lines 54-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to control the low pass filtering of the modified receiver system of Isberg et al, Auvray, and Smith et al in order to reduce energy leakage from strong channels which may cause erroneous measurements in adjacent channels as suggested by Duong et al (col 4, lines 59-61).

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isberg et al (US 6,029,052) in view of Auvray (US 5,564,076) in view of Smith et al (US 5,796,772) and further in view of Eklof (US 6,308,050).

Regarding claim 9, Isberg et al, Auvray, and Smith et al disclose the receiver of claim 3, wherein Isberg et al, Auvray, and Smith et al don't further disclose the receiver further comprising means for implementing channel filtering realized in a digital manner. Eklof discloses the receiver is further comprising means 122 for implementing channel filtering realized in a digital manner (fig. 1; col 4, lines 45-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement channel filtering realized in a digital manner in the modified receiver system Isberg et al, Auvray, and Smith et al in order to extract the lowest frequency band for demodulation as suggested by Eklof (col 4, lines 45-47).

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isberg et al (US 6,029,052) in view of Auvray (US 5,564,076) in view of Smith et al (US 5,796,772) and further in view of Heck et al (US 5,483,691).

Regarding claim 10, Isberg et al, Auvray, and Smith et al disclose the receiver of claim 3, wherein Isberg et al, Auvray, and Smith et al don't further disclose:

the receiver further comprising means for controlling the gain of the second amplifier. Heck et al disclose the receiver further comprising means (122, 116; fig. 1) for controlling the gain of the second amplifier (Baseband Amp 114 or 118 figure 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to gain control the base-band amplifier of Isberg et al and Auvray in order to adjust the baseband signal to a desired level for signal processing while protecting the stages before the baseband amplifiers from overdriving while maintaining a good signal to noise ratio as suggested by Heck et al (col 3, lines 13-18).

7. Claims 2, 12, 16, 20, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auvray (US 5,564,076) in view of Razavi (RF Microelectronics, copyright 1998) in view of Auvray (US 5,953,641) and further in view of Smith et al (US 5,694,414).

Regarding claim 2, Auvray discloses a method for processing signals for transmission to different radio interfaces of communication systems (system GSM DCS 1800 cellular radio and system Globalstar satellite radio; col 5, lines 3-13; col 4, lines 10-30; figs. 1 & 2), comprising steps in which:

a digital quadrature baseband signal is generated within GMSK modulator module 27 (a digital quadrature baseband signal is produced within the GMSK modulator 27 based on an input digital baseband signal 25 on the basis of the information signal to be transmitted (col 4, lines 49-51; see fig. 2 and hereafter); the digital baseband quadrature signal is converted to analog within GMSK modulator module 27 (col 4, lines 49-54);

a TX mixing signal (213i, 213Q) at a transmit frequency is generated via a TX synthesizer 215 (col 4, lines 55-63);

a carrier frequency transmission signal (218) is generated (col 4, lines 64-66) from the baseband quadrature signal (25) by mixing the digital baseband quadrature signal with the TX mixing signal (213i, 213Q) (from synthesizer loop 214-216; col 4, lines 55-63),

the carrier frequency transmission signal generated (218) is amplified (via 217, 219; col 4, lines 64-66), and the amplified carrier-frequency transmission signal is transmitted to the radio interface via antenna 221 (col 4, lines 66-67),

the generating of the carrier-frequency signal is performed with one and same mixer (211i, 211Q; considered as one mixer splitted into in phase and quadrature components mixing for both transmission modes or bands) for signals to be transmitted to at least two different radio interfaces (col 4, lines 55-63; col 5, lines 10-13), and the amplifying of the carrier frequency signal is performed with one and same amplifier (217) for signals to be transmitted to at least two different radio interfaces (dual band; col 4, line 64 - col 5, line 13). Auvray doesn't specifically disclose: specific

components within the GMSK modulator module for producing a digital quadrature baseband signal and to convert the digital quadrature baseband signal to analog; and wherein the generating of a TX mixing signal at the transmit frequency comprises for at least one radio interface dividing a frequency of an output signal generated by the TX synthesizer.

Razavi discloses wherein a digital quadrature baseband signal is produced after the digital Gaussian filter produces a phase from the baseband data input to be mapped into an in phase and quadrature component, at sine ROM and cosine ROM, within the GMSK baseband pulse shaping in GMSK systems (figure 5.38, pages 150-153); wherein the quadrature baseband signals, produced at sine ROM and cosine ROM, are fed to digital to analog converters DACs within the GMSK baseband pulse shaping system, wherein the Gaussian filter, integrator, sin ROM and cosine ROM corresponds to the GMSK modulator module 27 of Auvray and wherein the LPFs corresponds to LPFs 29i, 29Q of Auvray, and mixers with input omegaLO=omega c when there's a direct conversion system from baseband to radio frequency as in figure 5.39 of Razavi corresponds to analog subsystem 210 with analog mixers 211i and 211Q of Auvray). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the means to produce a quadrature signal and to convert the digital signal to analog within the GMSK modulator of Auvray in order to specify common specific components within a typical GMSK modulator to produce a quadrature signal more accurate digitally through a digital Gaussian filter first instead of analog and then convert the digital quadrature signal to an analog quadrature signal to analog mixers for

more accuracy purposes from a digitally implemented Gaussian filter instead of analog implementation and then to convert the digital baseband quadrature signal to analog in order to convert to a transmission format recognizable by the analog mixers of Auvray which is analogous to the original signal as suggested by Razavi (page 150, lines 24-27). Auvray (US 5,564,076) and Razavi fail to further disclose wherein the generating of a TX mixing signal at the transmit frequency comprises for at least one radio interface dividing a frequency of an output signal generated by the TX synthesizer.

However, Auvray (US 5,953,641) discloses a method for multimode transmission wherein the generating of a TX mixing signal at the transmit frequency comprises for at least one radio interface dividing (via DIV; fig. 1) the frequency of the output signal generated by a TX synthesizer (SYN; see fig. 1; col 4, lines 33-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a controllable frequency divider of Auvray (US 5,953,641) in the synthesizer of Auvray (US 5,564,076) in order to change the frequencies by a factor and channel selection to obtain the frequencies of another frequency band to respond to the requirements of another communication system as suggested by Auvray (US 5,953,641; col 4, lines 33-40).

Auvray and Razavi do not disclose a gain of the amplifier is set with a programmed controlled gain control signal in relation to the radio interface to which the amplified carrier frequency transmission signal is transmitted, the output signal of the TX synthesizer is selected with a program-controlled frequency selection signal in relation to the radio interface to which the amplified carrier frequency transmission signal is

transmitted. Smith et al disclose a gain of the amplifier (115; fig. 2) is set with a programmed controlled gain control signal (tunable gain amplifier) in relation to the radio interface to which the amplified carrier frequency transmission signal is transmitted (col 6, line 63 – col 7, line 3), the output signal of the TX synthesizer (105) is selected with a program-controlled frequency selection signal to which the amplified carrier frequency transmission signal is transmitted (tunable or programmable based on the mode that is being tranmitted). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the synthesizer and amplifier of Auvray and Razavi for the tunable synthesizer and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one synthesizer to provide the proper carrier for either mode while controlling the gain to its optimum according to the level of the signal to tune to the appropriate band in the dual mode transmitter as suggested by Smith et al.

Regarding claim 12, Auvray discloses a direct conversion transmitter operating at different radio interfaces of communication systems (system GSM DCS 1800 cellular radio and system Globalstar satellite radio; col 5, lines 3-13; col 4, lines 10-30; figs. 1 & 2), comprising:

- means (within GMSK modulator module 27) for generating a digital baseband signal on a basis of an information signal to be transmitted (based on a digital baseband signal 25 from DSP1 24; see fig. 2 and hereafter; col 4, lines 49-51);

- converting the baseband transmission signal to analog within GMSK modulator module 27 so that it outputs an analog quadrature signal 28i, 28Q to analog modulator 210 containing analog mixers 211i, 211Q; col 4, lines 49-54);

- a controllable low-pass filter (29i, 29Q) for filtering the analog baseband transmission signal in order to perform channel filtering according to the radio interface selected (col 4, lines 51-54),

- mixing means (211i, 211Q) for producing a signal at the carrier frequency (output signal at 217; col 4, lines 55-65) from the filtered analog baseband transmission signal by means of the TX mixing signal (col 4, lines 55-63);

- an amplifier (219) for amplifying the signal at the carrier frequency (col 4, lines 64-66),

- a synthesizer (215) for generating a TX mixing signal at the transmit frequency (col 4, lines 55-63);

- antenna means (221) for transmitting the amplified transmission at the carrier frequency (col 4, lines 66-67).

- wherein the means for generating a TX mixing signal at the transmit frequency comprises a TX synthesizer (215),

- the mixing means for producing the carrier-frequency signal (211i, 211Q; considered as one mixer splitted into in phase and quadrature components mixing for both transmission modes) is common for processing signals for transmission in at least two different radio interfaces (col 4, lines 55-63; col 5, lines 10-13), and

- the transmitter amplifier (217) is common for amplifying carrier frequency signals for transmission to at least two different radio interfaces (dual band; col 4, line 64 - col 5, line 13).

Auvray doesn't specifically disclose means for implementing channel filtering realized in a digital manner, specific means for generating a digital quadrature baseband signal and a digital to analog converter for converting the digital baseband quadrature signal to analog within the GMSK modulator wherein the means for generating a TX mixing signal at the transmit frequency comprises a controllable frequency divider for dividing the frequency of the output signal generated by the TX synthesizer.

Razavi discloses means (Gaussian filter; fig. 5.38) for implementing channel filtering realized in a digital manner, specific means (integrator, sine ROM and cosine ROM; see figure 5.38; pages 150-151) for generating a digital quadrature baseband signal and a digital to analog converter (DAC; figure 5.38; pages 150-151) (wherein a digital quadrature baseband signal is produced after the digital Gaussian filter produces a phase to be mapped into an in phase and quadrature component, at sine ROM and cosine ROM, within the GMSK baseband pulse shaping in GMSK systems and LPF to filter the baseband transmission signal, pages 150-151). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specific means for generating a digital quadrature baseband signal and an analog to digital converter within the GMSK modulator of Auvray in order to output an analog quadrature baseband signal to analog mixers of Auvray by specifically producing a digital quadrature signal first from the specific cos ROM and sin ROM components of a typical GMSK modulator

system of Razavi for more accuracy purposes from a digitally implemented Gaussian filter instead of analog implementation and then to convert the digital baseband quadrature signal to analog in order to convert to a transmission format recognizable by the analog mixers of Auvray which is analogous to the original signal. Auvray (US 5,564,076) and Razavi fail to further disclose wherein the means for generating a TX mixing signal at the transmit frequency comprises a controllable frequency divider for dividing the frequency of the output signal generated by the TX synthesizer. However, Auvray (US 5,953,641) discloses a multimode direct conversion transmitter wherein the means (SYN, DIV) for generating a TX mixing signal at the transmit frequency comprises a controllable frequency divider (DIV) for dividing the frequency of the output signal generated by a TX synthesizer (SYN) (see fig. 1; col 4, lines 33-65). Therefore, would have been obvious to one of ordinary skill in the art at the time the invention was made to use a controllable frequency divider in order to change the frequencies by a factor and channel selection to obtain the frequencies of another frequency band to respond to the requirements of another communication system as suggested by Auvray (US 5,953,641; col 4, lines 33-40). Auvray and Razavi do not disclose a gain of the amplifier is set with a programmed controlled gain control signal in relation to the radio interface to which the amplified carrier frequency transmission signal is transmitted via mode controller, as well as an output frequency selection input for receiving a program-controlled output adapted to select the output frequency of the means for generating a TX mixing signal according to the radio interface selected. Smith et al disclose a gain of the amplifier (115; fig. 2) is set with a programmed

controlled gain control signal in relation to the radio interface to which the amplified carrier frequency transmission signal is transmitted via mode controller 103 (col 6, line 63 – col 7, line 3), as well as an output frequency selection input for receiving a program-controlled output adapted to select the output frequency of the means for generating a TX mixing signal (105; fig. 2) according to the radio interface selected (tunable or programmable based on the mode that is selected) (col 8, lines 8-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the synthesizer and amplifier of Auvray and Razavi for the tunable synthesizer and amplifier of Smith et al in order to allow the modified receiver system of Isberg et al and Auvray to reduce and simplify the circuitry components with one synthesizer to provide the proper carrier for either mode while controlling the gain to its optimum according to the level of the signal to tune to the appropriate band in the dual mode transmitter as suggested by Smith et al.

Regarding claim 16, Auvray (US 5,564,076), Razavi, and Auvray (US 5,953,641) disclose the transmitter of claim 12, wherein Auvray (US 5,953,641) further discloses the transmitter is that the frequency divider (DIV) is arranged so as to divide the TX synthesizer's output signal (OL) always at least by two in order to generate a TX mixing signal OL (col 4, lines 33-48; fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to divide the synthesized signal at least by two to divide the mixing signal with a simple divider which cuts the synthesized signal by half to mix a lower signal with the baseband transmission signal as suggested by Auvray (US 5,953,641).

Regarding claim 18, Auvray, Razavi, and Smith et al disclose the transmitter of claim 12, where Smith et al disclose the transmitter comprising a power amplifier section (115; fig. 2) in the amplifier and a control input for receiving a control signal to the power amplifier section for controlling the operating frequency band of the power amplifier via mode controller 103 (col 6, line 63 – col 7, line 5).

Regarding claim 19, Auvray, Razavi, and Smith et al disclose the transmitter of claim 12, wherein Smith et al disclose the transmitter further comprising a bandpass filter (117) for filtering the amplified transmission signal at the carrier frequency (fig. 2; col 7, lines 5-12), and means (103) for selecting the pass band of the transmitter bandpass filter (117) so that it corresponds to the transmission frequency (fig. 2, col 7, lines 5-12).

Regarding claim 20, Auvray, Razavi, and Smith et al disclose the transmitter of claim 12, wherein Auvray (US 5,564,076) discloses wherein the signal processing path (mixers 211, LPFs 29i, 29Q, 211i, 211Q, 216, 217, 219, 220, 215, 214, 22, 24, 27) comprises substantially the same components for connecting to the different radio interfaces for transmitting in dual mode.

Regarding claim 24, Auvray discloses direct-conversion transmitter circuitry for operating in different radio communication systems (GSM, DCS, 1800 cellular and Globalstar; col 5, lines 3-13; col 4, lines 10-30; figs.1&2) comprising:

an input for receiving a digital baseband quadrature signal representing an information signal to be transmitted (col 4, lines 49-51),

a mixer (211i, 211Q) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the Tx mixing signal,

an amplifier (219) adapted to amplify the signal at the carrier frequency (col 4, lines 64-66), and

an output (antenna 221) for transmitting the amplified signal at the carrier frequency (col 4, lines 66-67); wherein the frequency synthesizer comprises a TX synthesizer (215), wherein said mixer (211i, 211Q) is common for processing signals for transmission in at least two different radio communication systems, and wherein said transmitter amplifier (217) is common for amplifying the carrier frequency signals for transmission to at least two different radio communication systems (col 4, line 64 – col 5, line 13). Auvray does not specifically disclose a digital-to-analog converter adapted to convert the digital baseband quadrature signal to analog. Razavi discloses a digital-to-analog converter (DAC; fig. 5.38) adapted to convert the digital baseband quadrature signal to analog (pgs. 150-151). It would have been obvious to one of ordinary skill in the art at the time the invention was made to convert the digital signal to analog in order to convert to a transmission format recognizable by the analog mixers of Auvray which is analogous to the original signal. Auvray and Razavi do not disclose a controllable frequency divider for dividing the frequency of the output signal generated by the TX synthesizer. Auvray (US 5,953,641) discloses a controllable frequency divider (DIV; fig. 1) for dividing the frequency of the output signal generated by the TX synthesizer (SYN; fig. 1; col 4, lines 33-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the divider to the synthesizer of Auvray and

Razavi in order to change the frequencies by a factor and channel selection to obtain the frequencies of another frequency band to respond to the requirements of another communication system as suggested by Auvray (col 4, lines 33-40). Auvray and Razavi do not disclose an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according the radio communication system selected and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of a transmitter amplifier (115; fig. 2) according to the radio communication system selected (col 6, line 63 – col 7, line 3).

Smith et al disclose an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of a frequency synthesizer (105) according the radio communication system selected (col 8, lines 8-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the synthesizer and amplifier of Auvray and Razavi with the tunable synthesizer and amplifier of Smith et al in order to provide the proper carrier for either mode and controlling the gain to its optimum according to the level of the signal to tune to the appropriate band as suggested by Smith et al.

Regarding claim 25, Auvray, Razavi, and Smith et al disclose the direct conversion transmitter circuitry according to claim 24, wherein Auvray (US 5,564,076) discloses the transmitter additionally comprising a controllable low-pass filter (29I, 29Q) between the digital-to-analog converter and the mixer, said controllable low-pass filter being adapted to filter the analog baseband quadrature signal in order to perform

channel filtering according to the radio communication system selected (col 4, lines 51-54).

Regarding claim 27, Auvray discloses a direct-conversion transmitter for operating in different radio communication systems, comprising:

a digital signal processor (24) to provide a baseband signal (25) representing an information signal to be transmitted (fig. 2);

a modulator (27) to provide an analog baseband quadrature signal to analog subsystem (210);

a controllable low-pass filter (29i, 29Q) adapted to filter the analog baseband quadrature signal in order to perform channel filtering according to the radio communication system selected (col 4, lines 51-54);

a frequency synthesizer (215) adapted to generate a TX mixing signal at a transmit frequency (col 4, lines 55-63), a mixer (211i, 211Q) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the TX mixing signal (col 4, lines 55-63), an amplifier (219) adapted to amplify the signal at the carrier frequency (col 4, lines 64-66), and an antenna (221) for transmitting the amplified signal at the carrier frequency (col 4, lines 66-67);

wherein said mixer (211i, 211Q) is common for processing signals for transmission in at least two different radio communication systems (col 4, lines 55-63; col 5, lines 10-13), and wherein said transmitter amplifier (217) is common for amplifying carrier frequency signals for transmission to at least two different radio communication systems (col 4, line 64 – col 5, line 13).

Auvray does not disclose wherein the frequency synthesizer (215) comprises a TX synthesizer and controllable frequency divider for dividing the frequency of the output signal generated by the TX synthesizer. Auvray (US 5,953,641) discloses wherein a frequency synthesizer comprising a TX synthesizer (SYN; fig. 1,) and controllable frequency divider (DIV) for dividing the frequency of the output signal generated by the TX synthesizer (col 4, lines 33-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a divider in order to change the frequencies by a factor and channel selection to obtain the frequencies of another frequency band to respond to the requirements of another communication system as suggested by Auvray. Auvray do not disclose the digital signal processor is adapted to produce a quadrature signal as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected. Gore et al disclose a digital signal processor (20) adapted to produce a digital baseband quadrature signal representing an information signal to be transmitted to input I and Q signals to modulator (18) (col 5, lines 28-35) as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected (col 17, line 45 – col 18, line 65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have quadrature baseband signals in order to provide direct quadrature signals to the modulator of Auvray and to provide achieve different tuning

sizes and derivation of transmit frequency steps in different frequency bands as suggested by Gore et al. Auvray and Gore et al do not disclose a digital-to-analog converter adapted to convert the digital baseband quadrature signal to analog. Razavi discloses a digital-to-analog converter (DAC; fig. 5.38) adapted to convert the digital baseband quadrature signal to analog (pgs. 150-151). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a digital to analog converter of Razavi in the modulator of Auvray in order to convert to a transmission format recognizable by the analog mixers of Auvray which is analogous to the original signal. Auvray, Gore et al, and Razavi do not disclose the transmitter comprises a gain control input for receiving a program-controlled gain control signal adapted to set according to the radio the gain of said transmitter amplifier communication system selected. Smith et al disclose a transmitter having a gain control input for receiving a program-controlled gain control signal adapted to set according to the radio the gain of said transmitter amplifier (115; fig. 2) of the communication system selected (col 6, line 63 – col 7, line 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the amplifier of Auvray for the amplifier of Smith et al in order to control the gain the its optimum aoccording to the level of the signal to tune to the appropriate band as suggested by Smith et al.

Regarding claim 29, Auvray discloses a device for wireless communication for operating in different radio communication systems (col 1, lines 59-61), comprising:

a digital signal processor (24) to provide a baseband signal (25) representing an information signal to be transmitted (fig. 2);

a modulator (27) to provide an analog baseband quadrature signal to analog subsystem (210);

a controllable low-pass filter (29i, 29Q) adapted to filter the analog baseband quadrature signal in order to perform channel filtering according to the radio communication system selected (col 4, lines 51-54);

a frequency synthesizer (215) adapted to generate a TX mixing signal at a transmit frequency (col 4, lines 55-63), a mixer (211i, 211Q) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the TX mixing signal (col 4, lines 55-63), an amplifier (219) adapted to amplify the signal at the carrier frequency (col 4, lines 64-66), and an antenna (221) for transmitting the amplified signal at the carrier frequency (col 4, lines 66-67);

wherein said mixer (211i, 211Q) is common for processing signals for transmission in at least two different radio communication systems (col 4, lines 55-63; col 5, lines 10-13), and wherein said transmitter amplifier (217) is common for amplifying carrier frequency signals for transmission to at least two different radio communication systems (col 4, line 64 – col 5, line 13).

Auvray does not disclose wherein the frequency synthesizer (215) comprises a TX synthesizer and controllable frequency divider for dividing the frequency of the output signal generated by the TX synthesizer. Auvray (US 5,953,641) discloses wherein a frequency synthesizer comprising a TX synthesizer (SYN; fig. 1,) and controllable frequency divider (DIV) for dividing the frequency of the output signal generated by the TX synthesizer (col 4, lines 33-65). It would have been obvious to one

of ordinary skill in the art at the time the invention was made to have a divider in order to change the frequencies by a factor and channel selection to obtain the frequencies of another frequency band to respond to the requirements of another communication system as suggested by Auvray. Auvray do not disclose the digital signal processor is adapted to produce a quadrature signal as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected. Gore et al disclose a digital signal processor (20) adapted to produce a digital baseband quadrature signal representing an information signal to be transmitted to input I and Q signals to modulator (18) (col 5, lines 28-35) as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected (col 17, line 45 – col 18, line 65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have quadrature baseband signals in order to provide direct quadrature signals to the modulator of Auvray and to provide achieve different tuning sizes and derivation of transmit frequency steps in different frequency bands as suggested by Gore et al. Auvray and Gore et al do not disclose a digital-to-analog converter adapted to convert the digital baseband quadrature signal to analog. Razavi discloses a digital-to-analog converter (DAC; fig. 5.38) adapted to convert the digital baseband quadrature signal to analog (pgs. 150-151). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a digital to

analog converter of Razavi in the modulator of Auvray in order to convert to a transmission format recognizable by the analog mixers of Auvray which is analogous to the original signal. Auvray, Gore et al, and Razavi do not disclose the transmitter comprises a gain control input for receiving a program-controlled gain control signal adapted to set according to the radio the gain of said transmitter amplifier communication system selected. Smith et al disclose a transmitter having a gain control input for receiving a program-controlled gain control signal adapted to set according to the radio the gain of said transmitter amplifier (115; fig. 2) of the communication system selected (col 6, line 63 – col 7, line 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the amplifier of Auvray for the amplifier of Smith et al in order to control the gain the its optimum aoccording to the level of the signal to tune to the appropriate band as suggested by Smith et al.

Response to Arguments

8. Applicant's arguments filed 5/01/06 have been fully considered but they are not persuasive.

Applicant states "a gain of the amplifier is set with a program controlled gain control signal in relation to the radio interface from which signals are received" is not disclosed by Smith. However, the programmed control signal of Smith is in response to the received radio band at the radio interface and not just to tune to different frequencies. The same explanation applies to claims 2, 3, 12, 21, 24, 26, 27, 28 and 29.

The cited reference, Isberg, utilizes a common low noise amplifier for signals received from at least two different frequency bands. Therefore reads on the cited passage of claim 1, "amplifying of the carrier frequency signal is performed with one and same amplifier for signals received from at least two different radio interfaces".

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., band selection function) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lana N. Le whose telephone number is (571) 272-7891. The examiner can normally be reached on M-F 9:30-18:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lana Le

Lana N. Le
06-29-06

LANA LE
PRIMARY EXAMINER